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**(54) DISPOSABLE CONTAINER FOR MOIST PAPER TOWELS AND A METHOD OF MAKING THE SAME**

**EINWEGVERPACKUNG FÜR FEUCHTE PAPIERHANDTÜCHER UND VERFAHREN ZUR HERSTELLUNG**

**CONTENEUR JETABLE POUR SERVIETTES EN PAPIER HUMIDE ET PROCÉDE DE PRODUCTION**

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## Descripti n

The present invention relates to the use of biodegradable, crush-resistant paperboard containers to store moist towels or napkins, and to towels or wipes having a lotion which does not suffer from leaking and break-through wetting when the towels or wipes are contained in the biodegradable containers.

It is well known to package dry towels, napkins and tissues of a multitude of shapes and sizes in simple cardboard containers.

Moist paper towels and napkins of a variety of shapes and sizes, with a variety of intended uses are currently available on the market. These towels are packaged in solid plastic containers to prevent seepage of the moisture in the towels through the containers and provide dimensional stability. Moisture seepage and a loss of strength are associated with the storage of moist towels in standard paperboard containers. The plastic containers which are currently available on the market suffer from the significant drawbacks that they are not biodegradable and use relatively large amounts of petrochemical based plastics. The plastic containers of the prior art suffer from the added disadvantage that they take up considerable room in existing waste disposal facilities.

For example, the combined weight of a plastic tub and lid is typically about 90 grams; whereas, the container of the present invention is typically only about 72 grams of which about 11 grams are plastic and the remaining 61 are pulp. Pulp is readily biodegradable under composting conditions and is considered a renewable resource. Composting is the process in which waste is degraded to humus or biomass under accelerated and controlled conditions of moisture, air and microorganisms. More specifically, paper, under composting conditions, is converted into carbon dioxide, water, and biomass. The biomass is essentially comprised of microorganisms. Thus, the mass of waste is significantly reduced and the humus by-product has commercial value as low grade fertilizer, soil conditioner, and as a mulch for land and agricultural applications.

Heavy thick plastic tubs are neither biodegradable under composting conditions nor are they taken from a renewable source. In addition to not being biodegradable, these plastic tubs are not incineratable.

Biodegradable paperboard containers are currently in use on the market for storage of such things as dry food products and photographic films. Many of these biodegradable containers use a low density polyethylene barrier coating to shield the contents from moisture, light, oxygen and spoilage.

Folded paperboard containers for containing liquids must meet the following general specifications:

- a. barrier properties sufficient to reduce or prevent absorption and/or transmission of liquid components;
- b. heat sealability for carton construction and integrity;

- c. printability to provide attractive, nonfunctional graphics;
- d. vapor barrier to contain fragrances, flavors, moisture, etc.;
- e. barrier to O<sub>2</sub> and other ambient gases; and
- f. rigidity, shape retention, and crush resistance.

Given the current waste disposal problems, an object of the present invention is to provide a disposable and substantially compostable, crush-resistant container which will allow storage of moist paper towels or napkins without the leakage problems and strength loss suffered by the prior art.

It is a further object of the present invention to provide a container having therein moist towels or napkins which do not suffer from seepage of moisture through biodegradable paperboard storage containers.

A further object of the invention is to provide a process of producing such a biodegradable container having moist towels therein which is free from leaks.

It is still an object of the present invention to provide a biodegradable container meeting with the general specifications set forth above for folded paperboard containers.

According to the invention, there is provided a biodegradable, crush-resistant container for moist towels comprising: a coated paperboard container having a Taber stiffness in the cross direction of the coated paperboard of at least 110, having a moisture resistant inner polymeric coating in a thickness of 0.5 to 6.0 mils (12.7 to 152.4  $\mu$ m), and having an outer barrier polymeric coating which is resistant to contamination and abrasion and which is water repellant, and having thereon moist towels having a lotion with a surface tension greater than about 27 dynes/cm (27 mN/m).

According to another aspect of the invention, there is provided a process of producing a biodegradable, crush-resistant container having moist towels therein which is substantially free from leaks, by formulating moist towels so that the lotion in the towels has a surface tension that is greater than 27 dynes/cm, providing a paperboard container as defined above, and placing the towels into the container and sealing the container.

In still another aspect of the present invention, there is provided a flushable moist towel for use in a biodegradable container wherein a moist towel contains a lotion having all natural ingredients and having at most about 99.3% water; at least 0.2% benzoic acid; at least 0.2% tartaric acid; at least 0.2% glycerine; and at least 0.1% citric acid.

Other objects and advantages will become apparent from the practice of the invention as set out in the following description.

According to the present invention a standard paperboard container having a thin moisture resistant inner coating for sealing purposes is used to store the moist towels or napkins. The paperboard for use in the present invention has a basis weight of at least 150 lbs/ream (68kg/ream) preferably about 175 lbs/ream

(79.4kg/ream) and more preferably about 215 lbs/ream (97.5kg/ream). According to one embodiment of the present invention, the paperboard has a thickness from about 15 to 30 mils (0.38 to 0.76mm) and more preferably about 18 to 25 mils (0.46 to 0.84mm). The coated paperboard should be selected to produce a container having a cross directional (CD) stiffness as determined by the Taber method of at least 110 and more preferably at least 135. The Taber method is described in TAPPI Test Procedure T-489.

The ratio of cross direction Taber stiffness of the coated paperboard to the basis weight (lb/ream) of the paperboard is at least 0.5 and more preferably at least 0.63.

Paperboard is generally stronger and stiffer in the machine direction (MD) than in the cross direction. According to one embodiment of the present invention the machine direction preferably runs along the container from side to side, i.e. in a direction perpendicular with the top and bottom of the container. The machine direction runs from side to side of the container; the fiber direction of the paperboard from top to bottom of the container is said to be the cross direction (CD). The coated paperboard used in the container according to the present invention preferably has a ratio of Taber stiffness of MD/CD of less than or equal to about 2.65, more preferably less than or equal to about 1.92.

The moisture resistant inner coating is a material capable of preventing moisture from the contents in the container from permeating the paperboard container. The coating material is preferably selected from polyolefin resins, more preferably low density polyethylene, and most preferably linear low density polyethylene to provide barriers against moisture, light and oxygen. The moisture resistant inner coating is a thin layer having a thickness from about 0.5 to about 6.0 mils (12.7 to 156 $\mu$ m), preferably having a thickness from about 1.0 to about 2.5 mils (25.4 to 64 $\mu$ m) and more preferably having a thickness from about 1.5 to 2.0 mils (38.1 to 50.1 $\mu$ m). Other coatings which may be used in certain embodiments of the present invention are e.g. silicon resins, polytetrafluoroethylene, polyethylene vinyl acetate, polyacrylates, Saran (polyvinylidene chloride), polyvinyl chloride and the like.

The moisture resistant inner coating can be applied to the paperboard using any conventional method which provides a non-peelable coating of the material on the paperboard. Preferably it is applied using extrusion coating.

Linear low density polyethylene (LLDPE) offers improved performance in strength, toughness and resistance to chemicals making it the preferred barrier coating. When forming a paperboard container or box, the stress within the container is very high due to the "memory" of the paperboard and accordingly, it has a tendency to unfold. Such recovery forces are focused on both the cohesive properties of the polymer itself at the seals and on the adhesive strength of the polymer to paperboard at the sealed edges or folds on the bottom. The coating

should be tough, i.e., high in strength and elongation, in order to yield rather than break and expose fibers of the paperboard which can wick fluids through by capillary action.

For example, a typical film of LLDPE based on DOWEX RESIN 2045, (Dow Chemical) has a Dart Impact value of 237. A typical film based on LDPE (Dow 122) has a Dart Impact value of 170. Ultimate tensile strength of the former film is 1.4 times higher in the machine direction and 1.6 times higher in the cross machine direction when compared to the latter film, thus making it the preferred choice.

Elongation to break values are also higher (i.e., 630 to 810% vs. 215 to 645%) making LLDPE tougher, more rubbery, more flexible and less likely to crack or break. See Veazey, E.W., "The Potential of LLDPE in Coextruded Film", Paper, Film and Foil Converter, Pp. 41-46, February 1983.

The outer barrier coating provides resistance to contamination, abrasion resistance and water repellency. The outer barrier coating is preferably selected from known plastic materials, more preferably selected from polyethylene, low density polyethylene, linear low density polyethylene, Saran, PVC, or polyester. For the reasons as described above, linear low density polyethylene is also the preferred outer barrier coating. The barrier coating is applied in a thickness from about 0.5 to about 3.0 mils (12.7 to 78 $\mu$ m), preferably from about 0.5 to about 1.5 mils (12.7 to 38.1 $\mu$ m), and more preferably from about 0.5 to about 1.0 mils (12.7 to 25.4 $\mu$ m).

The outer barrier coating can be applied using any conventional method. Preferably, it is applied by impregnation or melt extrusion coating. Melt extrusion coating is the extrusion of molten polymer onto the paperboard. Impregnation is the superior method for applying the outer barrier coating but it is more expensive thereby making melt extrusion coating the preferred method of applying the outer barrier coating.

Coating techniques, for example, extrusion coating, impregnation and the like, are well known in the art, and in accordance with the present invention, inner coatings and outer barrier coatings may be applied by processes well known in the art. Furthermore, the design, quality control and fabrication of folded cartons for the containment of liquids are well known in the art, and these processes and techniques may be used in making the containers of the present invention.

The container which is preferable for use with the present invention has cut ends which are sealed to avoid seepage of the liquid into or out of the body of the paperboard. The sealing of the edges may be done in a variety of manners. It may be accomplished by coating the edges, or by thinning the material down near the cut edges, i.e., skivving. Skivving of the edges is followed by folding the skivved areas over the cut edges.

In a preferred embodiment, there is a moisture-impervious membrane provided over the contents. Such membranes are sometimes referred to as lidding stock or material. Membranes for this application are typically

comprised of a strong barrier top layer with a heat sealable lower layer. Non-limiting examples of top layers which may be used in the present invention, include polyester and metallized polyester, high density polyethylene, arid paper. Non-limiting examples of heat seal layers include low density polyethylene and copolymers or mixtures with vinyl acetate. The edges of the membrane are adhered to the upper edges of the container and provide an effective storage and shipping seal. The membrane should peel away from the edges of the container at the seal without exposure of pulp fibers. Additionally a moisture-impervious membrane can be heat sealed at the bottom of the container as well. The bottom of the container is preferably heat sealed by applying heat and pressure, as well known in the art.

In one embodiment, when the consumer obtains the product, the consumer rips open a perforation providing a slot or opening in the paperboard, and permitting the hinged cap-like lid to be raised. This exposes the membrane, which is easily peeled off with the fingers and either stored in the box or thrown away. Thereafter, sealing is done entirely by the raising and lowering of the hinged lid. The moist towels or napkins are preferably stacked and lie horizontally in the container and may be individually removed as needed.

An advantage of the structure according to the invention is that almost all of the container is paperboard which is a naturally degradable material. This makes the packaging much more ecologically and environmentally sound and desirable. In addition, unlike commonly used plastic tubs, the containers according to the present invention may be incinerated.

It is also possible to provide a separate or separable pouch, bag or liner within the container to provide further waterproofing protection. Alternatively, this separable liner may be supplied during refilling of the container using a prepackaged bag of replacement wipes.

The container according to the present invention provides sufficient stiffness to provide the consumer with a container having improved handleability and to provide crush resistance of the box during storage, shipment and under conditions of household use. Unlike plastic containers currently in use, the containers in accordance with the present invention can be collapsed after use with the important advantage of reduced space in waste management treatment such as landfills and commercial composting. Containers according to the present invention preferably have a compression strength of at least 60 lbs (27.2kg) and more preferably at least 70 lbs (31.8kg) as tested in accordance with TAPPI Test Procedure T-804. The container should also preferably have a cross directional Ring Crush of at least 115 lbs (52.2kg) and more preferably at least 140 lbs (63.5kg). Ring crush can be defined according to TAPPI Test Procedure T818 om-87. The compression strength of the containers is indicative of stacking and handling ability of the containers. Higher stiffness and crush resistance in the cross direction of the paperboard provides improved stacking and handling of the containers.

Wet wipe containers typically contain over 80 wipes which are consumed during a period of at least one week. In light of the repeated handling and dispensing, it was surprising to find during testing, that the paperboard containers meeting the specification described herein provided satisfactory crush resistance and dimensional stability when compared to the current 100% plastic tubs. In accordance with the present invention, it is now practical from both a cost and performance viewpoint, to design and construct crush resistant and shape retentive containers from paperboard of basis weight at least 150 lbs/ream (68kg/ream), preferably 175 lbs/ream (79.4kg/ream) and more preferably 215 lbs/ream (97.5kg/ream) coated on at least the inner side and preferably both sides with at least 0.5 mil (12.7µm) of a coating material, for example, of polyethylene, in which said coated paperboard has a Taber Stiffness in the cross-machine direction of at least 100 and preferably at least 135.

The lotion for use in the towels or wipes preferably includes alkyl and aryl organic acids, polyhydric alcohol, lanolin derivatives, preservatives, a pH adjuster such as citric acid or a phosphate and fragrance. Non-limiting examples of alkyl organic acids include citric acid and tartaric acid and a non-limiting example of an aryl organic acid is benzoic acid. More preferably, the lotion also contains a skin softening agent and/or a cleansing agent. The polyhydric alcohol is preferably propylene glycol or glycerine. The lanolin derivative is preferably PEG 75 lanolin. The preservatives preferably include methyl paraben, propyl paraben, diazolidinyl urea and citric, benzoic and tartaric acids. The pH adjuster is preferably citric acid. The skin softening agent is preferably aloe vera. The cleansing agent is preferably cocoamphodiacetate. Other agents well known in the art can be added to the lotion composition or used as substitutes for those set forth above.

The lotion in the towels or wipes to be stored in the container should have a surface tension of greater than about 27 dynes/cm and preferably greater than about 29 dynes/cm after being expressed from the towels in the presence or absence of rewetting agents in the fabric. When a towel or wipe has a lotion with a surface tension greater than the standard surface tension (29 to 32 dynes/cm) of those available on the market today, it may be stored in a coated paperboard container which has the advantages of disposability and biodegradability. Surface tension herein was measured by the DuNouy method according to ASTM D-1331.

The surface tension of the wipes which are currently available on the market, may be raised to a level suitable for use in the present invention by reducing the polypropylene glycol (PPG), reducing the moisturizer for example, cocoamphodiacetate, and/or reducing the fragrance emulsifier for example, nonoxyl-9.

In one embodiment, the products according to the present invention provide the use of natural formula lotions in a biodegradable container.

Natural formula NF-1 with fragrance has a surface tension of about 34.6 dynes/cm and without fragrance NF-1 UNSC has a surface tension of 62.3 dynes/cm prior to fabric saturation. Surface tension values expressed from saturated towels were 28.6 dynes/cm and 29.9 dynes/cm respectively.

One all natural composition preferably includes  
 at most about 99.3% water,  
 at least 0.2% benzoic acid,  
 at least 0.2% tartaric acid,  
 optionally, at least 0.2% aloe vera,  
 at least 0.2% glycerine,  
 at least 0.1% citric acid.

The use of natural lotion formulation is preferred with wipes which may be flushable.

In a second embodiment, the wipes may contain a lotion formulation which is not completely natural. One preferred composition includes deionized water, propylene glycol, aloe vera, diazolidinyl urea, methylparaben, propylparaben, tetrasodium EDTA and citric acid. More particularly, the composition includes:

at most about 98.55% by weight of deionized water;  
 at least 1.00% by weight of Germaben II which includes  
 about 56% propylene glycol, about 30% diazolidinyl urea,  
 about 11% methylparaben and about 3% propylparaben;  
 optionally at least 1.00% by weight aloe vera gel;  
 at least 0.30% by weight of Versene 220 (tetrasodium EDTA); and  
 at least 0.15% by weight of citric acid.

In the selection of lotion and coatings to ensure the longest possible useful shelf life and durability during use, it is desirable to prevent or reduce the wetting of the fibers that may occur through pinholes, tears, or breaks in the coating or through the exposure of fibrous cut edges in the paperboard. These phenomenon can be related to capillary rise.

$$\Delta P = 2 \gamma_{LV} \cos \theta / r$$

wherein P is the pressure difference across the capillary (pore or void with radius r within the paper). A large positive P is indicated when wetting is desirable. A large negative P is indicated when repelling is the objective. In accordance with the present invention, repelling is desired, i.e., a large negative P. To achieve the latter, the contact angle should be as large as possible.

Since,  $\cos \theta = (\gamma_{SV} - \gamma_{SL}) / \gamma_{LV}$  wherein  
 $\gamma_{SV}$  is surface tension solid-vapor,  
 $\gamma_{SL}$  is surface tension solid-liquid, and  
 $\gamma_{LV}$  is surface tension liquid-vapor, it follows that

$$\Delta P = 2 (\gamma_{SV} - \gamma_{SL}) / r.$$

A large negative P may be achieved by lowering  $\gamma_{SV}$  and by increasing  $\gamma_{SL}$ . Lower  $\gamma_{SV}$  can be obtained by coating the paperboard with polymers such as, e.g.,

polyolefin, fluorocarbon resins, and silicone resins. Polyolefins are preferred based on low cost.

Increased  $\gamma_{SL}$  is achieved by minimizing the amount of surface active material added to the water in the lotion. Fabrics which are manufactured without wetting agents are also desirable as these agents are extracted into the lotion resulting in lower surface tension.

The product according to the present invention and its preparation will be more completely described by means of the following examples. These examples are not to be considered as limiting.

#### EXAMPLE 1

##### 15 Comparative

The lotion with fragrance used in this example had a surface tension of 33.5 dynes/cm prior to web saturation. When the lotion was expressed from the treated towel it was lowered to 30.8 dynes/cm due to the presence of rewetting agents in the base fabric or web.

Original folded carton packages in which both sides of the paper were coated with 0.5-2 mils (12.7 to 50.8  $\mu$ m) of low density polyethylene were filled with the above described baby wipes.

The results were deemed unacceptable as the wipes caused wetting and severe weakening of the coated paper.

Leakage and wetting of the paperboard can occur through large breaks or cracks in the coating due to poor control of the extrusion process or to surface irregularities in the paperboard. Peeling of the inner coating from the paperboard substrate can expose sections of paperboard as large as 0.25-0.50 inch (6.3 to 12.7 mm) in diameter leading to rapid failure of the container. The case of Example 1, the peeling of the inner coating from the paperboard was responsible for the unacceptable results.

#### 40 EXAMPLE 2

##### Inventive

A Baby Washcloth lotion was formulated to achieve a higher surface tension. The new formula as set forth in the second embodiment above, gave a surface tension of 41.9 dynes/cm prior to fabric saturation. The new formula was unscented. Fragrances are oily materials and are typically mixed with water through the addition of strong surfactants.

Original folded carton packages in which the insides of the paper were coated with 0.5-1.0 mil (12.7 to 25.4  $\mu$ m) of linear low density polyethylene and the outside were coated with standard low density polyethylene were filled with the above described baby wipes.

Packaged wet wipes from this second group exhibited no strike through wetting of the carton after months of ambient storage. During actual use the wipes were easily dispensed, the carton provided excellent resist-

ance to outside contamination, and the last wipes used exhibited excellent retention of lotion. The packaged wipes lost only about 10-15% by weight after ambient storage for several months.

### EXAMPLE 3

Paperboard at 215 lbs/ream (97.5kg/ream) basis weight 19 mils (0.48mm) thick was extrusion coated with LDPE at a level of 25 lbs/ream (11.4kg/ream) (1.0-2.0 mils) (25.4 to 50.1µm) and 12 lbs/ream (5.4kg/ream) (0.5-1.0) (12.7 to 25.4µm) on alternate sides. Total basis weight was measured at 261 lbs/ream (118.4kg/ream).

Rolls of this material were printed with the appropriate baby wipe graphics and then scored and cut into individual carton blanks with the heavier coating on the inside of the carton.

The edge of the inside seal was skived removing approximately 50% of the board thickness at the width of 7.0 mm. The skived edge was folded over so that the inner sealed edge would not expose uncoated paperboard. The bottom of the carton was then formed through the action of automated folders followed by thermal sealing to make a water tight box.

Stacks of lotion saturated baby wipes (84 count) were then loaded into a carton. A film was thermally sealed to the top edges, and the box lid was sealed shut with hot melt adhesive. The baby wipe fabric was James River Airtex 1.6 oz/yard<sup>2</sup> (54.2g/m<sup>2</sup>). The dry weight of 84 towels 7.0 x 8.5 inches (17.8 x 21.6cm) was typically around 180g. After saturation with lotion, the stocks weighed an average of 767g. The lotion pickup was 320%.

The composition of the lotion was the same as the natural lotion formulation NF-1 described above with the addition of a fragrance comprised of 75% by weight perfume and 25% by weight surfactant Tween 20. (3.3 lbs (1.5kg) fragrance was added to 500 lbs (226.8kg) of solution). The surface tension of lotion expressed from the towels was 29.9 dynes/cm.

Strips of the coated paperboard of Example 3 had the following stiffness values:

Taber Stiffness, MD x CD	261 x 136
Ring Crush, lb MD x CD	148 x 140

Compression Strength of the container was 62 lbs (28kg). The rate of Water Vapour Transmission was 0.0461 gm/100in<sup>2</sup>/24 hour (7.15g/m<sup>2</sup> per day) as measured by ASTM F1249-90. The inner coated side of the container had a surface tension of 52 dynes/cm and the outer coated side had a surface tension of 54 dynes/cm as measured by ASTM D 2578.

### EXAMPLE 4

The steps described in Example 3 were repeated with the following exceptions. The paperboard was 205 lbs/ream (93kg/ream) basis weight (also 19 mils (0.48mm) thick). The plastic film was sealed both above and below the wipe contents of the box. The lotion was

unscented and had a surface tension of 29.0 dynes/cm when extracted from the saturated towels.

The weight loss upon standing at room temperature (72-75°F (22 to 24°C) was 10 gms/month.

Strips of the coated paperboard of Example 4 had the following stiffness:

Taber Stiffness, MD x CD	306 x 114
Ring Crush, lb MD x CD	157 x 135

Compression Strength of the container was 65 lbs (29.5 kg)

Consumer home use testing of the wet wipes in paperboard containers from Examples 3 & 4 showed both packages to be acceptable in performance. With respect to overall box durability including crush resistance and dimensional stability, the package of Example 3 was preferred over Example 4 due to the higher stiffness in the top to bottom direction (i.e. cross direction) of the container.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope and spirit of the invention being indicated by the following claims.

### Claims

1. A biodegradable, crush-resistant container for moist towels comprising: a coated paperboard container having a Taber stiffness in the cross direction of the coated paperboard of at least 110, having a moisture resistant inner polymeric coating in a thickness of 0.5 to 6.0 mils (12.7 to 152.4 µm), and having an outer barrier polymeric coating which is resistant to contamination and abrasion and which is water repellant, and having therein moist towels having a lotion with a surface tension greater than about 27 dynes/cm (27 mN/m).
2. A container as claimed in Claim 1, characterised in that the paperboard has a basis weight of at least 150 lbs/ream (68kg/ream) and preferably at least 175 lbs/ream (79.4kg/ream).
3. A container as claimed in any preceding Claim, characterised in that the moisture resistant inner coating is applied in a thickness of 1.0 to 2.5 mils (25.4 to 63.5 µm).
4. A container as claimed in any preceding Claim, characterised in that the outer barrier coating is applied in a thickness of 0.5 to 3.0 mils (12.7 to 76.2 µm) and preferably in a thickness of 0.5 to 1.5 mils (12.7 to 38.1 µm).
5. A container as claimed in any preceding Claim, characterised in that the inner and/or outer coatings are polymers selected from polyethylene, low density polyethylene, linear low density polyethylene, poly-

olefins, Saran, PVC, polyester, polyethylene vinyl acetate and polyvinyl acetate.

6. A container as claimed in Claim 5, characterised in that the inner and the outer coatings are of linear low density polyethylene. 5
7. A container as claimed in any preceding Claim, characterised by a membrane barrier located at the upper edge of the container overlying the contents of the container. 10
8. A container as claimed in any preceding Claim, characterised in that the Taber stiffness in the cross direction of the coated paperboard is at least 135. 15
9. A container as claimed in any preceding Claim, characterised in that the ratio of Taber stiffness of MD/CD (machine direction/cross direction) of the coated paperboard is less than 2.65 and preferably less than 1.92. 20
10. A container as claimed in any preceding Claim, characterised in that the bottom of the container is heat sealed. 25
11. A container as claimed in any preceding Claim, characterised by a separable pouch or liner within the container. 30
12. A container as claimed in any preceding Claim, characterised in that the moist towels have a lotion with a surface tension greater than 27 dynes/cm (27 mN/m) and preferably greater than 40 dyne/cm (40 mN/m). 35
13. A process for producing a biodegradable crush-resistant container having moist towels therein which is substantially free from leaks which comprises: formulating moist towels so that the lotion in the towels has a surface tension that is greater than 27 dynes/cm (27 mN/m), placing the towels in a container as claimed in any preceding Claim and sealing the container. 40
14. A process as claimed in Claim 13, characterised by heat sealing the bottom of the paperboard container prior to placing the towels therein. 45
15. A lotion for use in moist towels in a biodegradable container characterised in that the lotion contains propylene glycol, lanolin derivatives, preservatives and pH adjuster and it possesses a surface tension greater than 27 dynes/cm (27 mN/m), after expression from the moist towels. 50
16. A lotion as claimed in Claim 15, characterised in that the lotion comprises deionized water, propylene glycol, diazolidinyl urea, methylparaben, propylpa-

raben, tetrasodium EDTA and citric acid, and optionally aloe vera.

17. A lotion as claimed in Claim 16, characterised in that the lotion contains: up to 97.55% by weight of deionised water; at least 1.0% by weight of Germanben II which includes 56% propylene glycol, 30% diazolidinyl urea, 11% methylparaben and 3% propylparaben; at least 1.0% by weight aloe vera gel; at least 0.3% by weight of Versene 220 (tetrasodium EDTA); and at least 0.15% by weight of citric acid.
18. A flushable moist towel for use in a biodegradable container comprising a moist towel containing a lotion which includes up to 99.3% water, at least 0.2% benzoic acid, at least 0.2% tartaric acid, at least 0.2% glycerine and at least 0.1% citric acid, and optionally at least 0.2% aloe vera.

#### Patentansprüche

1. Biologisch abbaubarer formstabiler Behälter für feuchte Handtücher, der aufweist: einen beschichteten Pappbehälter mit einer Taber-StEIFigkeit in der Querrichtung der beschichteten Pappe von mindestens 110, mit einer feuchtigkeitsfesten inneren Polymerbeschichtung in einer Dicke von 0,5 bis 6,0 Tausendstel Zoll (12,7 bis 152,4 µm) und mit einer äußeren Barrieren-Polymerbeschichtung, die widerstandsfähig gegen Verschmutzung und Verschleiß ist und die wasserabweisend ist, und mit feuchten Handtüchern darauf, die eine Lotion mit einer Oberflächenspannung größer als etwa 27 Dyn/cm (27 mN/m) aufweisen.
2. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß die Pappe ein Grundgewicht von mindestens 150 Pfund/Ries (68 kg/Ries) und vorzugsweise mindestens 175 Pfund/Ries (79,4 kg/Ries) hat.
3. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die feuchtigkeitsfeste innere Beschichtung in einer Dicke von 1,0 bis 2,5 Tausendstel Zoll (25,4 bis 63,5 µm) angewendet wird.
4. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die äußere Barrierenbeschichtung in einer Dicke von 0,5 bis 3,0 Tausendstel Zoll (12,7 bis 76,2 µm) und vorzugsweise in einer Dicke von 0,5 bis 1,5 Tausendstel Zoll (12,7 bis 38,1 µm) angewendet wird.
5. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die innere und/oder äußere Beschichtung Polymere sind, die aus Polyethylen, Polyethylen niedriger Dichte, Polyethylen niedriger Dichte mit linearer Struktur,

Polyolefinen, Saran, PVC, Polyester, Polyethylenvinylacetat und Polyvinylacetat ausgewählt werden.

6. Behälter nach Anspruch 5, dadurch gekennzeichnet, daß die innere und die äußere Beschichtung aus Polyethylen niedriger Dichte mit linearer Struktur sind. 5
7. Behälter nach einem der vorangehenden Ansprüche, gekennzeichnet durch eine am oberen Rand des Behälters angeordnete Membranbarriere, die über dem Inhalt des Behälters liegt. 10
8. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Taber-Steifigkeit in der Querrichtung der beschichteten Pappe mindestens 135 beträgt. 15
9. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß das Verhältnis der Taber-Steifigkeit von MD/CD (Papierlaufrichtung/Querrichtung) der beschichteten Pappe weniger als 2,65 und vorzugsweise weniger als 1,92 beträgt. 20
10. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß das Unterteil des Behälters heißgesiegelt ist. 25
11. Behälter nach einem der vorangehenden Ansprüche, gekennzeichnet durch eine separable Tasche oder Einlage innerhalb des Behälters. 30
12. Behälter nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die feuchten Handtücher eine Lotion mit einer Oberflächenspannung größer als 27 Dyn/cm (27 mN/m) und vorzugsweise größer als 40 Dyn/cm (40 mN/m) aufweisen. 35
13. Verfahren zum Herstellen eines biologisch abbaubaren, formstabilen Behälters mit feuchten Handtüchern darin, der im wesentlichen frei von Undichtigkeiten ist, das aufweist: Ansetzen feuchter Handtücher, so daß die Lotion in den Handtüchern eine Oberflächenspannung hat, die größer als 27 Dyn/cm (27 mN/m) ist, Anordnen der Handtücher in einem Behälter nach einem der vorangehenden Ansprüche und Versiegeln des Behälters. 40
14. Verfahren nach Anspruch 13, gekennzeichnet durch Heißsiegeln des Unterteils des Pappbehälters vor dem Anordnen der Handtücher darin. 45
15. Lotion zum Gebrauch in feuchten Handtüchern in einem biologisch abbaubaren Behälter, dadurch gekennzeichnet, daß die Lotion Propylenglycol, Lanolinderivate, Konservierungsmittel und eine pH-Einstellvorrichtung enthält und sie nach Ausdrücken 50

aus den feuchten Handtüchern eine Oberflächenspannung größer als 27 Dyn/cm (27 mN/m) besitzt.

16. Lotion nach Anspruch 15, dadurch gekennzeichnet, daß die Lotion entionisiertes Wasser, Propylenglycol, Diazolidinylharnstoff, Methylparaben, Propylparaben, Tetranatrium-EDTA und Zitronensäure und wahlweise Aloe vera aufweist. 55
17. Lotion nach Anspruch 16, dadurch gekennzeichnet, daß die Lotion enthält: bis zu 97,55 Gew.-% entionisiertes Wasser; mindestens 1,0 Gew.-% Germaben II, das 56% Propylenglycol, 30% Diazolidinylharnstoff, 11% Methylparaben und 3% Propylparaben enthält; mindestens 1,0 Gew.-% Aloe vera gel; mindestens 0,3 Gew.-% Versene 220 (Tetranatrium-EDTA); und mindestens 0,15 Gew.-% Zitronensäure. 60
18. Spülbares feuchtes Handtuch zum Gebrauch in einem biologisch abbaubaren Behälter, der ein feuchtes Handtuch aufweist, das eine Lotion enthält, die bis zu 99,3% Wasser, mindestens 0,2% Benzoesäure, mindestens 0,2% Weinsäure, mindestens 0,2% Glycerin und mindestens 0,1% Zitronensäure und wahlweise mindestens 0,2% Aloe vera enthält. 65

#### Revendications

1. Conteneur biodégradable, résistant à l'écrasement pour serviettes humides comprenant : un conteneur en carton revêtu ayant une rigidité Taber dans la direction transversale du carton revêtu d'au moins 110, ayant un revêtement intérieur polymérique résistant à l'humidité, d'une épaisseur de 0,5 à 0,6 mils (12,7 à 152,4 µm) et ayant un revêtement externe polymérique d'arrêt qui est résistant à la contamination et à l'abrasion et qui est hydrophobe, et comprenant des serviettes humides contenant une lotion avec une tension superficielle supérieure à environ 27 dynes par cm (27 mN par m). 70
2. Conteneur suivant la revendication 1, caractérisé en ce que le carton a un poids de base d'au moins 150 livres par rame (68 kg par rame) et de préférence, d'au moins 175 livres par rame (79,4 kg par rame). 75
3. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que le revêtement interne résistant à l'humidité est appliqué avec une épaisseur de 1,0 à 2,5 mils (25,4 à 63,5 µm). 80
4. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que le revêtement externe d'arrêt est appliqué avec une épaisseur de 0,5 à 3,0 mils (12,7 à 76,2 µm), et de préférence, avec une épaisseur de 0,5 à 1,5 mils (12,7 à 38,1 µm). 85



5. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que les revêtements interne et/ou externe sont des polymères choisis parmi le polyéthylène, le polyéthylène basse densité, le polyéthylène linéaire basse densité, les polyoléfines, le Saran, le PVC, le polyester, le poly(acétate d'éthylène et de vinyle) et le poly(acétate de vinyle). 5
6. Conteneur suivant la revendication 5, caractérisé en ce que les revêtements interne et externe sont en polyéthylène linéaire basse densité. 10
7. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé par une membrane d'arrêt placée sur le bord supérieur du conteneur et superposée au contenu du conteneur. 15
8. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que la rigidité Taber dans la direction transversale du carton revêtu est d'au moins 135. 20
9. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que le rapport de la rigidité Taber de DM/DT (direction de la machine/direction transversale) du carton revêtu est inférieur à 2,65 et de préférence, inférieur à 1,92. 25
10. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que le fond du conteneur est scellé à chaud. 30
11. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé par un étui ou sachet séparable dans le conteneur. 35
12. Conteneur suivant l'une quelconque des revendications précédentes, caractérisé en ce que les serviettes humides ont une lotion avec une tension superficielle supérieure à 27 dynes par cm (27 mN par m) et de préférence, supérieure à 40 dynes par cm (40 mN par m). 40
13. Procédé de production d'un conteneur biodégradable, résistant à l'écrasement, contenant des serviettes humides, qui est essentiellement exempt de fuites, qui comprend : la formulation des serviettes humides de sorte que la lotion dans les serviettes ait une tension superficielle supérieure à 27 dynes par cm (27 mN par m), l'introduction des serviettes dans un conteneur suivant l'une quelconque des revendications précédentes et la fermeture du conteneur. 45  
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14. Procédé suivant la revendication 13, caractérisé par le scellement à chaud du fond du conteneur en carton avant l'introduction des serviettes dans celui-ci.
15. Lotion à utiliser pour des serviettes humides dans un conteneur biodégradable, caractérisée en ce qu'elle contient du propylèneglycol, des dérivés de la lanoline, des conservateurs et un agent d'ajustement du pH et en ce qu'elle possède une tension superficielle supérieure à 27 dynes par cm (27 mN par m), après expression des serviettes humides.
16. Lotion suivant la revendication 15, caractérisée en ce qu'elle comprend de l'eau déminéralisée, du propylèneglycol, de la diazolidinylurée, du méthylparaben, du propylparaben, de l'EDTA tétrasodique et de l'acide citrique et facultativement, de l'aloë vera.
17. Lotion suivant la revendication 16, caractérisée en ce qu'elle contient : jusqu'à 97,55% en poids d'eau déminéralisée; au moins 1,0% en poids de Germanben II qui comprend 56% de propylèneglycol, 30% de diazolidinylurée, 11% de méthylparaben et 3% de propylparaben; au moins 1,0% en poids de gel d'aloë vera; au moins 0,3% en poids de Versene 220 (EDTA tétrasodique); et au moins 0,15% en poids d'acide citrique.
18. Serviette humide jetable à utiliser dans un conteneur biodégradable, constituée d'une serviette humide contenant une lotion qui comprend jusqu'à 99,3% d'eau, au moins 0,2% d'acide benzoïque, au moins 0,2% d'acide tartrique, au moins 0,2% de glycérine et au moins 0,1% d'acide citrique, et facultativement au moins 0,2% d'aloë vera.